Laws and Regulations Committee
Interim Agenda

Joe Benavides, Chairman
Texas Weights and Measures

Reference
Key Number

200 INTRODUCTION

The Laws and Regulations Committee (Committee) will address the following items at its Interim Meeting. Table A identifies agenda items by Reference Key Number, title, and page number. The first three digits of the Reference Key Numbers of the items are assigned from the subject series listed below. The fact that an item may appear on the agenda does not mean it will be presented to the NCWM for a vote, The Committee may withdraw some items, present some items for information and further study, issue interpretations, or make specific recommendations for changes to the publications listed below. The recommendations presented in this agenda are statements of proposal and not necessarily recommendations of the Committee. The appendices to the report are listed in Table B.

This agenda contains recommendations to amend National Institute of Standards and Technology (NIST) Handbook 130, "Uniform Laws and Regulations," 2006 edition, and NIST Handbook 133, "Checking the Net Contents of Packaged Goods," Fourth Edition. Revisions proposed for the handbooks are shown in **bold face print** by ~~crossing out~~ information to be deleted and underlining information to be added. Additions proposed for the handbooks are designated as such and are shown in **bold face print**. Proposals presented for information only are designated as such and are shown in *italic* type. "SI" means the International System of Units. "FPLA" means the Fair Packaging and Labeling Act. The section mark, "§," is used in most references in the text and is followed by the section number and title, (for example, Section 1.2. Weight). When used in this report, the term "weight" means "mass."

Subject Series

Table A
Index to Reference Key Items

Table B
Appendices

Daily Schedule

Sunday, January 22

1:00 p.m. - 5:00 p.m. **Committee Review Session:** This session is open to all NCWM members but participation in the discussion is generally limited to members of the Committee.

Monday, January 23

8:30 a.m. - 5:00 p.m. **Committee Open Hearings:** Comments will be accepted on the following topics:

232 Method of Sale Regulation
237 Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation
250 Interpretations and Guidelines
260 NIST Handbook 133

Tuesday, January 24

8:30 a.m. - 12:00 p.m. **Committee Open Hearings (continued):** Comments will continue to be accepted on the above topics.

1:00 p.m. - 5:00 p.m. **Committee Work Session:** This session is open to all NCWM members but participation in the discussion is generally limited to members of the Committee.

Wednesday, January 25

8:30 a.m. - 11:00 a.m. **Committee Work Session:** This session is open to all NCWM members but participation in the discussion is generally limited to members of the Committee.

11:00 a.m. - 12:00 p.m. **Joint Session with all Standing Committees**

Details of all Items
(In order by Reference Key Number)

232 METHOD OF SALE REGULATION

232-1 Temperature Compensation for Petroleum Products

Source: Southern Weights and Measures Association (SWMA). (See item 232-4 in the Report of the 89th NCWM Annual Meeting in 2004.)

Proposal: Amend the Method of Sale Regulation in Handbook 130 by adding the following:

2.XX. Temperature Correction For Petroleum Products Other Than LPG. – All petroleum products other than LPG shall be sold by liquid volume.

2.XX.1. Petroleum products sold in volumes greater than 18,927 liters (5,000 U.S. gallons) may be corrected to the volume at 15 °C (60 °F), provided:

2.XX.1.1. The correction is made through automatic means; and

2.XX.1.2. The measuring device and all associated documents clearly indicate the volume has been corrected for temperature.

2.XX.2. Petroleum products sold in volumes less than or equal to 18,927 liters (5,000 U.S. gallons) through *(list specific device(s))* may be corrected to the volume at 15 °C (60 °F), provided:

2.XX.2.1. The correction is made through automatic means;

2.XX.2.2. The measuring device and all associated documents clearly indicate the volume has been corrected for temperature; and

2.XX.2.3. All sales by the same vendor within a state are corrected over at least a 12-month period.

2.XX.3. The volume of petroleum products sold through retail motor fuel devices and in all transactions not covered in 2.XX.2. or 2.XX.3. shall be the volume at the conditions at the time of sale. Products shall not be artificially heated prior to sale.

Discussion: Selling fuel adjusted to the volume at 15 °C (60 °F) throughout the distribution system is the most equitable way fuel can be sold without the buyer or seller gaining a competitive advantage. Allowing a distributor to buy product at wholesale by gross volume and sell it at retail by net volume is not equitable. A single method of sale should be required so a prospective customer can make a value comparison. There is no practical way customers can make value comparisons when some locations sell product temperature compensated and other locations sell the same product without temperature compensation.

This item is considered in conjunction with a temperature compensation item that is before the Specifications and Tolerances (S&T) Committee, Item 331-1, although the S&T Committee's item is limited to vehicle-tank meters. The Committee believes this is an important issue that should be given careful consideration. The Committee also believes this item needs to be discussed with parties that may be affected by its adoption. The Committee has requested authorization and funding from the Board of Directors to establish a work group to bring together interested parties and build a consensus on the best way to resolve this issue.

A similar proposal was made by NEWMA in 2000 that mirrored a temperature compensation item before the S&T Committee at the time. In 2000 NEWMA noted that Pennsylvania, New Hampshire, Maine, and Canada permit

temperature compensation in sales of products like home heating fuel and retail gasoline. In 2001 the Committee withdrew this item after hearing testimony from several jurisdictions that opposed it.

The Committee heard several comments opposing the original language of this item and received an alternate recommendation from NEWMA. The Committee voted to accept and circulate the NEWMA language for comments.

Regarding the NEWMA language, a comment was made that the 5000-gallon threshold proposed in Section 2.XX.2. is too large because, although the capacity of a tanker truck is more than 5000 gallons, many trucks are compartmentalized. The compartmentalization of the trucks results in the delivery of a single product (e.g., grade of fuel) that is significantly less than 5000 gallons; 1500 gallons was proposed as an appropriate alternative.

Regarding the NEWMA language, it was suggested to the Committee that language would need to be inserted into Section 2.XX.3. to recognize the need to heat certain viscous products, like Heating Oil #4 and Heating Oil #6, in order to allow them to flow properly.

The Committee also heard several comments opposing the permissive nature of the NEWMA language. There is concern that permitting temperature compensation without mandating it will lead to some companies choosing to compensate while others choose not to. How is a consumer to make an informed purchasing decision when faced with choosing between competitors who are selling the same product using different methods of sale? Related to this, the Committee received an alternate proposal to go back to the original language but mandate temperature compensation for those devices capable of pumping at a rate in excess of 20 gallons per minute, and prohibit it for everything else. This would effectively require temperature compensation for all vehicle tank meters, wholesale and terminal meters, and large volume diesel dispensers while prohibiting it for standard retail motor-fuel devices.

The Committee listened to other comments expressing support for the permissive nature of the NEWMA language. Some comments expressed concern about the burden of educating consumers about what temperature compensation is and how it will affect their evaluation of options when making purchasing decisions.

The Committee will retain this item as a developing item until a consensus can be reached on the language to be considered for adoption.

232-2 Biodiesel and Fuel Ethanol Labeling

Source: Central Weights and Measures Association (CWMA)

Proposal: Add the biodiesel and fuel ethanol labeling requirements that currently appear in the Handbook 130 Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation to the Handbook 130 Method of Sale Regulation.

Add the following text to the Method of Sale Regulation in Handbook 130:

2.XX. Biodiesel.

2.XX.1. Identification of Product. – Biodiesel and biodiesel blends shall be identified by the capital letter B followed by the numerical value representing the volume percentage of biodiesel fuel. (Examples: B10; B20; B100)

2.XX.2. Labeling of Retail Dispensers Containing Between 5 % and 20 % Biodiesel. Each retail dispenser of biodiesel blend containing more than 5 % and up to and including 20 % biodiesel shall be labeled with either:

2.XX.2.1. The capital letter B followed by the numerical value representing the volume percentage of biodiesel fuel and ending with 'biodiesel blend.' (Examples: B10 biodiesel blend; B20 biodiesel blend), or;

2.XX.2.2. The phrase 'biodiesel blend between 5 % and 20 %' or similar words.

2.XX.3. Labeling of Retail Dispensers Containing More Than 20 % Biodiesel. – Each retail dispenser of biodiesel or biodiesel blend containing more than 20 % biodiesel shall be labeled with the capital letter B followed by the numerical value representing the volume percentage of biodiesel fuel and ending with either 'biodiesel' or 'biodiesel blend.' (Examples: B100 Biodiesel; B60 Biodiesel Blend)

2.XX.4. Documentation for Dispenser Labeling Purposes. – The retailer shall be provided, at the time of delivery of the fuel, with a declaration of the volume percent biodiesel on an invoice, bill of lading, shipping paper, or other document. This documentation is for dispenser labeling purposes only; it is the responsibility of any potential blender to determine the amount of biodiesel in the diesel fuel prior to blending.

2.XX.5. Exemption. – Biodiesel blends containing 5 % or less biodiesel by volume are exempted from requirements 2.XX.1 through 2.XX.4.

2.YY. Fuel Ethanol.

2.YY.1. How to Identify Fuel Ethanol. – Fuel ethanol shall be identified by the capital letter E followed by the numerical value volume percentage. (Example: E85)

2.YY.2. Retail Dispenser Labeling. – Each retail dispenser of fuel ethanol shall be labeled with the capital letter E followed by the numerical value volume percent denatured ethanol and ending with the word 'ethanol.' (Example: E85 Ethanol)

2.YY.3. Additional Labeling Requirements. – Fuel ethanol shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 306.

Discussion: This proposal does not impose any new requirements. These requirements have already been adopted and are published in the Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation in Handbook 130. This proposal would simply place duplicate requirements into the Method of Sale Regulation in Handbook 130.

Section 2.20 of the Method of Sale Regulation in Handbook 130 currently contains requirements for the disclosure of oxygenates in gasoline blends. Including requirements for the disclosure of biodiesel in diesel blends and ethanol in gasoline blends is consistent with this practice and should be required in order to ensure the consumer is fully informed when making a purchasing decision.

237 ENGINE FUELS, PETROLEUM PRODUCTS, AND AUTOMOTIVE LUBRICANTS REGULATION

237-1 Premium Diesel Lubricity

Source: Southern Weights and Measures Association (SWMA)

Proposal: Forward the following proposal to the Petroleum Subcommittee to review and consider.

Amend Section 2.2.1. in Handbook 130 Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation as follows:

2.2.1. Premium Diesel Fuel – All diesel fuels identified on retail dispensers, bills of lading, invoices, shipping papers, or other documentation with terms such a premium, super, supreme, plus, or premier must conform to the following requirements:

(a) Cetane Number – A minimum cetane number of 47.0 as determined by ASTM Standard Test Method D 613.

(b) Low Temperature Operability – A cold flow performance measurement which meets the ASTM D 975 tenth percentile minimum ambient air temperature charts and maps by either ASTM Standard Test Method D 2500 (Cloud Point) or ASTM Standard Test Method D 4539 (Low Temperature Flow Test, LTFT). Low temperature operability is only applicable October 1 - March 31 of each year.

(c) Thermal Stability – A minimum reflectance measurement of 80 % as determined by ASTM Standard Test Method D 6468 (180 min, 150 °C).

(d) Lubricity – A maximum wear scar diameter of 520 µm as determined by ASTM D 6079. ~~**If an enforcement jurisdiction's singe test of more than 560 µm is determined, a second test shall be conducted. If the average of the two tests is more than 560 µm, the sample does not conform to the requirements of this part.**~~

Discussion: A member of the petroleum industry believes that the test and associated tolerances for lubricity on premium diesel specified in Section 2.2.1.(d) are inconsistent with that for regular diesel. Effective January 1, 2005, the test tolerance for regular diesel lubricity will be the ASTM D 6079 reproducibility of 136 µm (see ASTM D 975-04b). NCWM has chosen to accept the ASTM reproducibility limits for all diesel (D 975) and gasoline (D 4814) properties (see Section 7.2.2., Reproducibility), but has chosen a different reproducibility limit for premium diesel lubricity without providing any explanation as to why the ASTM reproducibility limit is insufficient. If the NCWM intends to impose a stricter lubricity requirement for premium diesel, it should designate a tighter specification for this property instead of a different test tolerance (e.g., for regular and premium gasoline, premium has a different octane specification than regular but the test tolerance is the same). ASTM reproducibility limits are, by definition, based on establishing a 95 % probability that product that should pass, will pass. Applying an average test as specified in Section 2.2.1.(d) reduces this probability to only 80 %.

The Committee received comments from several members of the Premium Diesel Work Group (Work Group) who do not support the item as presented by the petroleum industry member. Work Group members felt that the process that led to the current definition was very thorough and complete, and that the premium diesel lubricity requirements were established with a full understanding of their implications. The Work Group members felt that knowledgeable individuals provided input to the process, which lead to the consensus position contained in the current regulation. The work being done by the Work Group was reported at meetings of ASTM Subcommittee E-2 every six months. The current regulation has been endorsed by the American Petroleum Institute, the Engine Manufacturer's Association, and the NCWM.

Prior to this requirement being adopted, the ASTM Lubricity Task Force conducted a great deal of research on this topic. Based on their research, the ASTM Lubricity Task Force had concluded that a limit of 520 microns would meet the requirements of equipment in the field. Since the passage of this model regulation, ASTM included a lubricity requirement for No. 1 and No. 2 diesel fuel effective January 1, 2005. The ASTM requirement is also 520 microns.

Work Group members reported that when this regulation was being written fuels with adequate lubricity provided a functional benefit to the end user. The Work Group agreed with the ASTM Lubricity Task Force that 520 microns was the correct limit to set for premium diesel. However, the Work Group's review process also indicated increased pump wear for fuels with High-Frequency Reciprocating Rig (HFRR) values greater than 560 microns. The current reproducibility value of the HFRR test method would have placed enforcement well beyond the 560 micron level, essentially allowing fuels with little lubricity protection to be sold as Premium. The Work Group felt they could not recommend a premium fuel standard that would permit excessive pump wear. Using the statistical tools provided in ASTM D 3244, the Work Group evaluated an enforcement limit of 560 microns. The statistical tools indicated that a single laboratory reporting the assigned test value would have an enforcement limit of approximately 80 % probability of acceptance, while the average of two separate laboratories reporting the assigned test value would have an enforcement limit of approximately 90 % probability of acceptance. It was agreed that for a premium fuel the average of two test results was the best approach given the current test methods and precision available. Therefore, if a test exceeds 560 microns, then a second test must be run. The average of the two tests must exceed 560 microns before a violation would occur. At this time, the Work Group members believe this remains the best approach.

The Committee believes it lacks the expertise necessary to adequately evaluate this proposal. The Committee voted to forward this proposal to the Petroleum Subcommittee for its review and consideration, and requests that the Subcommittee provide the Committee with its recommendation.

250 INTERPRETATIONS AND GUIDELINES

250-1 Basic Engine Fuels, Petroleum Products, and Lubricants Laboratory

Source: Western Weights and Measures Association (WWMA)

Proposal: Remove the Basic Engine Fuels, Petroleum Products, and Lubricants Laboratory Guidelines from Handbook 130 and instead make an updated version (see Appendix A) available on the Internet.

Amend Handbook 130 Interpretations and Guidelines Section 2.6.6. by striking all of the current text and replacing it with the following:

> **2.6.6. Basic Engine Fuels, Petroleum Products, and Lubricants Laboratory**
> **(Developed by the Petroleum Subcommittee)**
>
> **The petroleum fuels and lubricant laboratory is an integral element of an inspection program and is generally developed to satisfy the testing requirements as described in the laws and rules of the regulating agency. Guidelines have been developed to assist States in evaluating their options of employing a private lab or building or expanding their own lab. This information has been placed on the NIST website and can be found at http://www.nist.gov/owm .**

Discussion: Handbook 130 Interpretations and Guidelines Section 2.6.6., Basic Engine Fuels, Petroleum Products, and Lubricants Laboratory, was adopted in 1994. Since that time it has not been updated despite the fact that laboratory equipment and costs change continually. It is believed that posting these guidelines on the Internet will allow for them to be updated in a more expedient manner than what is permitted by the National Conference process. Eliminating the National Conference process from the updating of these guidelines is not believed to be detrimental because the guidelines are informative, not regulatory.

It has also been suggested that the Petroleum Subcommittee be made responsible for reviewing and updating these guidelines on no less than a biannual basis.

250-2 Guideline for the Method of Sale of Fresh Fruits and Vegetables

Source: Northeast Weights and Measures Association (NEWMA)

Proposal: Amend Handbook 130 Interpretations and Guidelines Section 2.3.2. by striking all of the current text (reproduced in Appendix B) and replacing it with the following:

> **2.3.2. Fresh Fruits and Vegetables**
> (Added 1979, Amended 1980, 1982, and **200X**)
>
> **This guideline applies to all sales of fruits and vegetables. There are two tables, one for specific commodities and one for general commodity groups. Search the specific list first to find those commodities that either don't fit into any of the general groups or have unique methods of sale. If the item is not listed find the general group in the second table. The item may be sold by any method of sale marked with an X.**

Specific Commodity	Weight	Count	Head or Bunch	Dry Measure (any size)	Dry Measure (1 dry qt or larger)
Artichokes	X	X			
Asparagus	X		X		
Avocadoes		X			
Bananas	X	X			
Beans (green, yellow, etc.)	X				X
Brussels Sprouts (loose)	X				
Brussels Sprouts (on stalk)			X		
Cherries	X			X	X
Coconuts	X	X			
Corn on the Cob		X			X
Dates	X				
Eggplant	X	X			
Figs	X				
Grapes	X				
Melons (cut in pieces)	X				
Mushrooms (small)	X			X	X
Mushrooms (Portobello, large)	X	X			
Okra	X				
Peas	X				X
Peppers (bell and other varieties)	X	X			X
Pineapples	X	X			
Rhubarb	X		X		
Tomatoes (except cherry)	X	X			X

General Commodity Group	Weight	Count	Head or Bunch	Dry Measure (any size)	Dry Measure (1 dry qt or larger)
Berries and Cherry Tomatoes	X			X	
Citrus Fruits (oranges, grapefruits, lemons, etc.)	X	X			X
Edible Bulbs (onions, garlic, leeks, etc.)	X	X	X		X
Edible Tubers (Irish potatoes, sweet potatoes, ginger, horseradish, etc.)	X				X
Flower Vegetables (broccoli, cauliflower, brussel sprouts, etc.)	X		X		
Gourd Vegetables (cucumbers, squash, melons, etc.)	X	X			X
Leaf Vegetables (lettuce, cabbage, celery, etc.)	X		X		
Leaf Vegetables (parsley, herbs, loose greens)	X		X	X	
Pitted Fruits (peaches, plums, prunes, etc.)	X	X			X

General Commodity Group	Weight	Count	Head or Bunch	Dry Measure (any size)	Dry Measure (1 dry qt or larger)
Pome Fruits (apples, pears, mangoes, etc.)	X	X			X
Root Vegetables (turnips, carrots, radishes, etc.)	X		X		

Discussion: The following information is provided as received by the submitter of this item:

The present Handbook 130 guidelines concerning the sale of fresh fruits and vegetables is outdated and in need of revision.

The current guidelines do not recognize or support innovation in modern retail food marketing approaches at all forms of outlets from typical grocery stores to upscale urban markets to the age-old farm markets. The present guidelines were primarily aimed at grocery stores. A while ago a local W&M jurisdiction went into a major, urban farm market complex and was about to issue multiple violations for using methods of sale not in conformance with the present guidelines. State level enforcement officials felt unable to support that action since the guideline was only a guideline and since many of the methods of sale could also fit under the exemption in the Method of Sale Regulation for traditional methods of sale.

The current guideline is presently in the form of a laundry list. It does not include many forms of exotic and unusual fruits and vegetables now readily available in the marketplace. As new items enter the market the Conference would be forever adding items to the list.

There are apparent contradictions in the present guideline that some greens can be sold by the bunch while others can't. For example, spinach can and kale can't.

The present guideline seems to ignore the typical limitations of the farm market. With few exceptions the present guideline accepts weight as an appropriate method of sale for almost all fruits and vegetables. Weight at the farm market is often not an option, as many do not even have scales, even at some of the urban farm market complexes. This leaves count, heads and bunches, and dry measure as the only options. However, in the case of dry measure, they don't recognize anything less than a peck. This is out of touch with the reality of today's consumer. They are not buying to can or preserve or to feed an army, they are buying for the family's needs for the next day or two. Marketers at small stores in our major cities tell us their customers often shop only for that day and shop almost every day. Many vendors sell vegetables like tomatoes and potatoes in heaped dry quart baskets. Why should this be precluded?

Even if a scale is used in a farmer's market situation, it is used in a completely different manner from a grocery store. If you bring just over two pounds of tomatoes to the front end in a grocery store, you get weighed to the 1/100th of a pound. You pay for the fraction over the two pounds. At the farm market they use a hanging dial scale in 1/2 ounce increments and ignore the fraction over the two pounds. Customers get that for free. At the same time, customers would complain bitterly if the weight didn't get over the two pound mark. People often shop at both types of outlets and have no objection to those differences.

New York reviewed the traditional methods of sale presently used at locations as diverse as they could find. Based on their findings, they began with the old guideline and developed a more simple form of guideline that they believe is far better than the old laundry list. New York started by looking at the four major methods of sale: weight, count, head or bunch, and dry volume. They then made it a goal to simplify the guideline classes and only leave a laundry list for the really unique items.

The major obstacle was the size of the dry measure. Traditionally this break occurred at two dry quarts. Berries were not to be sold in larger containers and all other dry measure items in containers that size or larger. New York found berry sales in containers of four quarts were common and even found them as large as six quarts. New York's research

found that many farm stands were using one dry quart containers for many items like tomatoes and peppers. In all of these instances the measure was heaped rather than struck. Consumers universally accepted this method of sale. New York assumes that this is because they can readily see what they are paying for. You can't say that about a grocery store, even with an estimator scale.

260 NIST HANDBOOK 133

260-1 Moisture Loss

Source: Northeast Weights and Measures Association (NEWMA)

Proposal: Amend Handbook 133 Section 2.3, Moisture Allowances (pages 17 through 19 of the Handbook) by striking all of the current text (reproduced in Appendix C) and replacing it with the following:

Moisture Allowances

Which products have an established moisture allowance?

The allowances listed below are based on the premise that when the average net weight of a sample is found to be less than the labeled weight, but not by an amount that exceeds the allowable limit, either the lot is declared to be in compliance or more information must be collected before deciding lot compliance.

1. Flour and dry pet food have a moisture allowance of 3 % of the labeled net weight. Note: Dry pet food means all extruded dog and cat foods and baked treat products packaged in Kraft paper bags and/or cardboard boxes with a moisture content of 13 % or less at the time of pack.

2. Meat and poultry products from a USDA inspected plant are permitted no moisture allowance when tested under a Category A sampling plan with Used Dry Tare.

3. Meat and poultry products from a USDA inspected plant are permitted the following moisture allowances when tested under a Category A sampling plan with Wet Tare. Note: When there is free-flowing liquid or absorbent packaging materials in contact with the product all free liquid is part of the wet tare.

- **For packages of fresh poultry that bear a USDA seal on inspection, the moisture allowance is 3 % of the labeled net weight. For net weight determinations only, fresh poultry is defined as poultry above 3 °C (26 °F). This is a product that yields or gives when pushed with the thumb.**
- **For packages of franks or hotdogs that bear a USDA seal of inspection, the moisture allowance is 2.5 % of the labeled net weight.**
- **For packages of bacon, fresh sausage, and luncheon meats that bear a USDA seal of inspection, there is no moisture allowance if there is no free-flowing liquid or absorbent materials in contact with the product and the package is cleaned of clinging material. Luncheon meats are any cooked sausage product, loaves, jellied products, cured products, and any sliced sandwich-style meat. This does not include whole hams, briskets, roasts, turkeys, or chickens requiring further preparation to be made into ready-to-eat sliced product. When there is no free-flowing liquid inside the package and there are no absorbent materials in contact with the product, Wet Tare and Dried Used Tare are equivalent.**

How do you determine the allowance for products without an established moisture allowance?

For any product subject to moisture loss/gain, you may determine the appropriate moisture loss allowance based on a scientific study for that product. Many packers have conducted studies that they can provide in support of any claim that the product lost/gained moisture.

Where the packer measures and records the moisture content of product in each lot, you may be able to measure the actual moisture loss since the time of pack. This method only applies to single lot codes. Select a random sample of two packages of the product offered for sale and have it tested for moisture content using a scientifically verified test procedure, e.g. like those in the Official Methods of Analysis of the Association of Official Analytical Chemists (see Appendix E). At the same time, request a copy of the moisture content data for that lot code from the packer. The actual moisture loss, in percent, is calculated as the moisture content (%) at time of pack minus the average moisture content (%) at time of sale from the two sample packages. In the case of moisture gain, this value will be a negative number.

Calculations

How do you apply a moisture allowance when conducting a test?

Moisture allowances may be applied either prior to measuring the package errors or after. The two methods are mathematically equivalent means of adjusting both the individual package errors and the sample average. It is common practice to apply the moisture correction prior to the test for those products with established moisture allowances like flour and dry pet food. In most other cases the correction is made after the test since moisture loss data will probably be obtained as part of the follow-up investigation after the initial test has failed.

How do you apply a moisture allowance before conducting a test?

To apply the moisture loss allowance prior to measuring the package errors, you correct the nominal gross weight in Box 14 (Handbook 133, Appendix E) for moisture loss. Find the value of the allowance by multiplying the labeled quantity by the decimal percent value of the allowance. Enter this value in Box 13a on the form. The nominal gross weight is found by adding the average tare (Box 13) to the label quantity (Box 1) and subtracting the moisture allowance (Box 13a). Lot compliance is evaluated in the normal way using decision criteria in Boxes 16 and 24 on the report form.

Example: Labeled quantity of a bag of flour is 2 lb and average tare is 0.04 lb (Box 13)

- **Moisture Allowance is 3 % (0.03) of 2 lb = 0.06 lb**
- ***Nominal Gross Wt. = 2 lb + 0.04 lb - 0.06 lb = 1.98 lb Record this value in Box 14.***

Measure the package errors and evaluate the inspection lot compliance following the normal procedure.

How do you apply a moisture allowance after conducting a test?

To apply the moisture loss allowance after testing, you correct only the MAV and SEL for moisture loss. The initial test will have been performed with no moisture allowance

in Box 13a. When moisture loss data becomes available, find the moisture loss allowance in weight units by multiplying the labeled quantity by the decimal percent value of the actual moisture loss. If using dimensionless units on the form, divide that number by the unit of measure in Box 2 to convert weight to dimensionless units. Add the computed moisture allowance to the MAV (Box 4) and SEL (Box 23) and record these new moisture corrected values in the remarks section.

Compare minus package error to the moisture corrected MAV. Record the number of minus error exceeding the moisture corrected MAV in the remarks section. Evaluate compliance by comparing this number to Box 8. The lot fails if the number of MAVs exceeds the number in Box 8.

Compare the lot average in Box 19 to the moisture corrected SEL. The lot fails if the sample average is greater than the SEL (ignoring the sign).

Sample Calculations: Labeled quantity of a package of rice is 2 lb, average tare is 0.04 lb (Box 13), MAV is 70 (Box 4) and SEL is 0.023 lb (Box 23).

- **Moisture content at time of pack was 13.4 % (packer data)**
- **Moisture content at time of sale is 10.6 % (average of lab data)**
- **Moisture loss is (13.4 % - 10.6 %) = 2.8 %**
- **Moisture allowance is 0.028 x 2 lb = 0.056 lb or 56 in dimensionless units for 0.001 lb unit of measure**
- **Moisture Corrected MAV is 70 + 56 = 126**
- **Moisture Corrected SEL is 23 + 56 = 79**

Discussion: The following information is provided as received by the submitter of this item:

The issue of moisture loss is complex and many components have to work together for a regulatory official to properly evaluate compliance of an inspection lot. The proposed changes affect four interrelated components of the issue. The specific issues are identified below with some justification for the changes that were proposed to the proposal.

1. Shouldn't all the established moisture allowances be listed in one place, rather than being listed as separate items? The proposal changes the questions from one of how you apply the allowance for a specific product to one of what products have established allowances. This brings these all together in one section that is easily found by the inspector. Bringing all the established allowances in one section is essentially editorial but it accentuates the void for all those other commodities for which no established moisture loss allowance exists.

2. How do you find moisture allowances for products that are not in the list in 1 above? The Handbook provides no guidance whatsoever! In the last line at the bottom of page 17, the text directs the inspector to follow steps if the product is listed, but says nothing about a product not listed. This is a huge omission that has many officials wondering what to do? The result is that some packers bluff by playing the moisture loss card even when not entitled to a loss (e.g., canned goods) and many officials back away from these products for lack of direction. The proposal includes the provision for comparing time of pack data with time of sale data for moisture content that was in the 3rd Edition and noticeably absent in the 4th Edition. It also would permit using data from a scientific study provided by the manufacturer in support of any claim of moisture loss.

3. When do you apply the moisture allowance in the test process? The proposal attempts to clarify that you can make the correction either before or after measuring the packages. Before works great for products with established moisture loss allowances like flour and dry pet foods. However, you can't possibly apply a correction before the test when dealing with other products. For other products, you must do additional investigation to determine the magnitude of the moisture

loss and you must apply it after the field official has completed the testing. The proposal provides procedures to follow for each case and examples of the calculations.

4. Why do we have different methods for evaluating the lot compliance depending on whether moisture allowances are applied before or after the tests? The basic procedure for evaluating test results calls for evaluating the individual packages against the MAV, and evaluating the sample average against the SEL. On page 19, that procedure is no longer used for the average and instead you have to look at a difference between the sample average and the SEL and now compare it to the moisture allowance. This minor change is confusing and unnecessary. Officials should always compare sample average to the SEL and this can be accomplished easily be adjusting the SEL rather than looking at differences. Thus, inspectors would follow the same process in evaluating the results in all cases. The change proposed is to add the moisture allowance to the SEL just as the Handbook now adds it to the MAV. In the proposed procedure after the test, you calculate a moisture-corrected MAV and a moisture-corrected SEL and simply reevaluate the original test data as you would any inspection. A few years ago the NCWM changed the method of calculating the Rc for tare variability to avoid having different methods for standard and random packages. Consistency helps inspectors apply the standard uniformly. The same argument may be invoked here.

The L&R Committee apparently found the complex issue difficult to follow and thus broke the original proposal into two items. It was suggested that the item be further split to assist in understanding it. In preparing this revision of the proposal, New York has tried to simplify it and has eliminated several of the original changes to focus on the critical issues. The Committee has two options. The first is a single complete revision of the part of Section 2.3 dealing with Moisture Loss (pages 17 - 19). The other is to treat this as two proposals. Proposal one would deal with the issue of products with an established moisture allowance and those without. Proposal two would deal with the issue of applying the allowance before or after the test and the procedures necessary to do each.

Joe Benavides, Texas, Chairperson
James Cassidy, Cambridge, Massachusetts
Vicky Dempsey, Montgomery County, Ohio
Dennis Johannes, California
Stephen Benjamin, North Carolina

Vince Orr, ConAgra Foods, Associate Member Representative
Doug Hutchinson, Canada, Technical Advisor
Brian Lemon, Canada, Technical Advisor
Kathryn Dresser, NIST, Technical Advisor

Laws and Regulations Committee

Appendix A

New (Proposed) Basic Engine Fuels, Petroleum Products, and Lubricants Laboratory Guidelines

Introduction

The petroleum fuels and lubricant laboratory is an integral element of an inspection program and is generally developed to satisfy the testing requirements as described in the laws and rules of the regulating agency. This document outlines the basic facets of such a laboratory and can be used as a model to initiate or upgrade a program. Since a testing program is of little value unless recognized standards and methods are utilized, this description of a model laboratory has been developed under the assumption that recognized ASTM International and SAE International standards and test methods have been incorporated into the laws, rules, and policies of the regulating agency.

This document provides sufficient information to investigate cost associated with the development of a fuels and lubricant laboratory. Information pertaining to facility needs, recommended ASTM test procedures, test equipment, and the number of personnel required for staffing has been included. Hidden costs associated with the unique working environment of laboratories are often overlooked during initial evaluations; therefore sections have also been included dealing with quality assurance, safety, and hazardous materials.

Laboratories may be required to perform additional analysis outside the purview of consumer regulations, e.g., analyses pertaining to environmental regulations or tax fraud investigations. This document will not address those areas specifically; however, information presented here may assist in the determination of general costs and requirements.

State-Operated or Contract

The decision to operate a State testing laboratory, to enter into a contractual agreement with a private testing laboratory, or to have a hybrid of the two depends on a variety of factors: the scope of the program, funding sources, political climate, etc. The question is often asked: "Is there a point at which it is cheaper for a State to operate its own fuels laboratory?" The Motor Fuel Task Force assembled in 1984 concluded that a program testing 6000 samples per year (500 samples per month) is the minimum level to justify building and equipping a fuel laboratory.

Consideration must be given to the time required for the laboratory to complete the analyses. The value of any inspection program is diminished if laboratory turnaround time is so great that the product is consumed before the results of an analysis are known. If a contract laboratory is chosen, analysis time should be given consideration during negotiations to ensure an effective program. Because of the hazardous nature of fuels, transportation can be difficult and costly and should be factored into the decision. A State-owned laboratory should be assured the proper resources, e.g., a full staff and well maintained instruments, to be able to meet satisfactory turnaround time.

Laboratory Facility

A testing laboratory requires a unique building designed to accommodate laboratory instruments ranging from a delicate gas chromatograph to octane engines capable of producing severe vibrations. In addition, extremely flammable liquids will be stored and tested throughout the facility. Obviously, the facility design must minimize the chances for explosion and fire and also be capable of withstanding the forces of an explosion. National Fire Protection Association (NFPA) 45, "Standard on Fire Protection for Laboratories Using Chemicals," should be reviewed with contractors to ensure minimum standards are met.

The actual design of the laboratory is dependant upon the products which will be tested. For example, if the octane or cetane number is to be determined, special considerations must be made for foundation and utilities.

Special considerations should be given to the following:

1. Sufficient ventilation to ensure that workers are not unduly exposed to gasoline fumes and other toxic vapors.

2. Fume hoods and exhaust systems in laboratory areas.

3. Drain lines resistant to acid and petroleum products.

4. Traps to prevent petroleum products from entering the sewer system.

5. Special foundations for ASTM/Cooperative Fuel Research Committee (CFR) engines. It is recommended that sufficient foundations for future expansion be installed during initial construction.

6. Necessary safety equipment, such as fire blankets, fire extinguisher, eyewash stations, etc.

7. Automatic fire extinguishing system for laboratory areas. The extinguishing system's design should include considerations regarding the susceptibility of laboratory instruments to damage when exposed to water or dry chemicals.

8. An adequate heating, ventilation, and air conditioning (HVAC) system to handle excess heat generated by distillation instruments and octane engines.

9. A properly designed and sized electrical system.

10. The laboratory's design to ensure all fuel testing can be performed in accordance with ASTM requirements. Volume 05.04 of the Annual Book of ASTM Standards contains valuable information regarding the design of a knock-testing laboratory.

11. Automatic hydrocarbon monitors to warn of critical accumulation of explosive vapors.

Several fixed equipment items are necessary for the laboratory's operation, including:

1. Air compressor, vacuum pump and piping of sufficient size to supply the entire laboratory's needs.

2. Gas and water piped to all areas of the laboratory.

3. Storage area for retained evidence, reference fuel and excess fuel and lubricant after analysis. Depending on the number of samples, this may consist of a properly ventilated storage area with locking storage cabinets and 55-gallon drums, to a flammable storage room and several 500-gallon storage tanks. (Larger tanks may be needed if they are to supplement the program's vehicle's needs.)

The size of the laboratory will depend upon the products tested and the estimated sample flow. The following space listing is for a small laboratory capable of testing approximately 6000 fuel samples per year. Some space requirements, such as those for octane testing, may seem large, but it is strongly recommended that two additional engine foundations be installed during initial construction.

1. Office, bathroom facilities, conference room, etc. (as required). No space requirements are listed as this must be determined by the user based on program needs and local building codes.

2. Octane laboratory–designed for four engines (75 m^2 [750 ft^2]).

3. General laboratory (70 m^2 [750 ft^2]).

4. Distillation laboratory (37 m^2 [400 ft^2]).

5. Shipping and receiving (includes preparation area for empty sample containers) (37 m^2 [400 ft^2]).

6. Flash point laboratory (19 m^2 [200 ft^2]).

7. Shop area (23 m^2 [225 ft^2]).

8. Storage for supplies (23 m^2 [225 ft^2]).

9. Secured, cooled, and ventilated sample and flammable storage area (23 m^2 [225 ft^2]). (Insulation and a dedicated ventilation and cooling system should be considered for this room.)

Total square footage (exclusive of item 1) - 30 m^2 (3225 ft^2). Including offices, bathroom facilities, hallways, etc., the total building size may exceed 372 m^2 (4000 ft^2). It is not necessary to isolate each testing operation into separate laboratories. However, because of the noise generated, it is recommended that the test engines (octane and cetane) be placed in a separate room.

If lubricant testing is to be performed, the size of the general laboratory will need to be increased. The amount of increase is dependant upon the tests which will be performed. However, if work is limited to viscosity measurement, an additional 37 m^2 (400 ft^2) should be sufficient.

Tests and ASTM Test Procedures

Careful consideration should be given to the selection of laboratory test procedures since these selections will affect instrument costs, number of personnel, timeliness of samples, and confidence in results. As previously mentioned, ASTM and SAE specifications and test methods are universally recognized standards for fuels and lubricants and should be the primary choice for test procedures. The ASTM Subcommittee D 02 on Petroleum Products and Lubricants is responsible for developing specifications and test procedures and is generally comprised of representatives from the petroleum industry, automotive manufacturers, and regulating agencies. This representation ensures that test procedures have been reviewed by each segment of the testing community and laboratory results obtained utilizing these procedures will be widely accepted.

New instrumental methods are often introduced to facilitate testing. Chemical methods have been devised to replace or screen physical methods which may enhance efficiency by reducing staff or analysis time necessary to perform physical methods. These methods are normally devised for a controlled environment, such as a processing plant, where physical parameters may be drawn with confidence. A new laboratory is cautioned to refrain from investing in this instrumentation and the laboratory expertise necessary to perform the test procedures until they are approved by ASTM. Screening methods have been employed by State laboratories to maintain or increase sample coverage. Screening procedures are a deviation of accepted ASTM procedures; certain sections of a procedure may be excluded or modified, such as chilling a sample to the appropriate temperature or accurately timing a distillation analysis. When a screen sample exceeds a predetermined parameter, the sample is analyzed using the proper ASTM procedure. Screening should be discouraged as a means to increase sample coverage. Strategies, such as selective sampling and testing, should be employed as a means for effective regulation.

Following are references to ASTM and SAE specifications and testing procedures which form an effective nucleus for a testing laboratory with regulatory responsibilities. ASTM test methods listed here do not necessarily exclude other ASTM procedures that are designed for the purpose and that give comparable results. The significance of each of these analyses is included in the ASTM specifications. Some of the test procedures listed make provisions to allow the use of automated equipment. Such equipment is usually more expensive. However, the increased cost can be recovered in a high production lab by reduced labor costs. The asterisks after test methods indicate a preferred method due to cost or ease of implementation.

Spark Ignition Engine Fuel Specifications – D 4814

1. Distillation	D 86
2. Octane (Antiknock Index)	
Research	D 2699
Motor	D 2700
3. Vapor Pressure	
Dry Method	D 4953
Automatic Method	D 5190*

Mini Method	D 5191*
Mini Method - Atmospheric	D 5482*

4. Oxygenate Content

GC with TC or FID	D 4815
GC with OFID	D 5599
Infrared Spectroscopy	D 5845

5. Sulfur Content (Due to environmental law and regulations, the sulfur limits shown in D 4814 may be significantly higher than specified. The detection limit and precision of each method should be considered when selecting a test method.)

X-Ray Spectrometry	D 2622
Microcoulometry	D 3120
Ultraviolet Fluorescence	D 5453

6. Water Tolerance D 6422

7. Workmanship D 4814

Diesel Fuel Specifications – D 975

1. Flash Point D 93

2. Distillation D 86

3. Sulfur Content (The appropriate test method is dependent upon the grade. The forthcoming reduction in sulfur content by EPA starting in June, 2006, will require equipment with lower detection limits and better precision.)

X-Ray Spectrometry	D 2622
Microcoulometry	D 3120
X-Ray Fluorescence	D 4294

4. Cloud Point

Manual Method	D 2500
Stepped Cooling (Automatic)	D 5771
Linear Cooling Rate (Automatic)	D 5772
Constant Cooling Rate (Automatic)	D 5773

5. Water and Sediment D 2709

6. Cetane D 613

7. Lubricity D 6079

Kerosene Specifications – D 3699

1. Flash Point D 56

2. Distillation D 86

3. Sulfur Content

X-Ray Spectrometry	D 2622
X-Ray Fluorescence	D 4294*
Ultraviolet Fluorescence	D 5453

4.	Color	D 156
5.	Water and Sediment	D 1796

Aviation Turbine Fuel - D 1655

1.	Flash Point	D 56
2.	Distillation	D 86
3.	Water Reaction	D 1094
4.	Freeze Point	D 2386

Motor Oil – SAE J300

1.	Kinematic Viscosity	D 445
2.	Cold Cranking Simulator	D 5293

Gear Oil – SAE J306

1.	Kinematic Viscosity	D 445
2.	Brookfield Viscosity	D 2983

Automatic Transmission Fluid

1.	Kinematic Viscosity	D 445
2.	Brookfield Viscosity	D 2983

Laboratory Equipment and Supplies

Scientific instrumentation is typically more expensive than initially anticipated even when one has experience purchasing equipment. ASTM has approved methods utilizing automated instruments which may prove to be a better long-term investment when the cost of operating personnel is included. The costs of equipment and supplies change, therefore, providing estimates in this document would be of little value. Because of the relatively small demand for laboratory equipment, it is common to have only one source. However, when possible, obtaining competitive bids can reduce costs. Purchasing used equipment from other labs or vendors can provide a source of equipment at reduced costs.

Information Management System

No recommendations are made for an information management system. However, it should be noted that an information management system is an effective tool to manage data and statistical information when devising sampling strategies and when measuring the general effectiveness of a program.

Minimum requirements for an information management system include a database server and database adequate to handle sample biographical and analyses information. A means to network technicians and staff to the information is necessary to facilitate transfer of information. Considerations for software security and equipment security (limited access to the database server) should be given to ensure the integrity of the data.

Many departments have established information management centers which are consulted for this information. Generally, these departments have a particular protocol for developing information management systems.

Office Equipment and Supplies

No listing is given since needs are determined by the program's scope. However, the costs of items such as desks, filing cabinets, computers, forms, and miscellaneous office supplies must be considered when planning an initial budget.

Quality Assurance/Quality Control

The previous sections have addressed structural aspects of an engine fuels testing laboratory: building requirements, testing procedures, and analytical instruments. The management system for a laboratory is as unique as the structural requirements. Quality assurance/quality control programs were originally devised to give statistical verification of analytical results; however, they are now evolving to become the standard management model for laboratories. Chain of custody procedures, sample retention procedures, sample distribution procedures, and documentation of each step has been integrated into the quality assurance program.

ASTM has developed two documents which provide quality assurance guidelines for a petroleum laboratory. They are ASTM D 6792, Quality System in Petroleum Products and Lubricants Testing Laboratories and ASTM D 6299, Applying Statistical Quality Assurance Techniques to Evaluate Analytical Measurement System Performance. The first document, D 6792, provides a guide to the essential aspects of a quality assurance program. It includes such issues as sample management, record management, accurate test data, proficiency testing, corrective actions, and training. The second document, D 6299, describes in great detail methods to assure test precision and accuracy.

Another source of information in establishing a quality assurance program is the International Organization for Standardization (ISO) model quality assurance program, ISO 9000. There is no accreditation program specifically for State testing laboratories, and ISO 9000 accreditation is currently quite expensive; however, the ISO 9000 is an excellent model to use in developing a management system.

One excellent method to evaluate the performance of a laboratory is to compare the results obtained with other laboratories. ASTM has developed an Interlaboratory Crosscheck Program to achieve this goal. Samples are periodically sent to participating labs for analysis. The results are submitted to the summarizer and statically compared to other participating laboratories. The summarized results are then compared to the published precision statements. Coded summary reports (to maintain confidentiality) are sent to each participant. The program includes automatic transmission fluid, aviation turbine fuel, engine oil, gear oil, gasoline and diesel fuel as well as other products.

ASTM operates a National Exchange Group (NEG) to distribute fuels among participating laboratories and provides a statistical report of the results. There are three subgroups of the NEG: the Motor Fuel Exchange Group, the Diesel Fuel Exchange Group, and the Aviation Gasoline Exchange Group. Of the three types of participation, only two will concern a state laboratory: a member laboratory receives monthly samples and agrees to participate in special method research; and a "quarterly participant" receives two sets of samples every 3 months but is not bound to run special tests. The NEG will provide a means for assessment of quality at the national level. There are also regional groups which provide similar quality assessment exchange programs: Appalachian, Atlantic, Great Lakes, Mid-Continent, Northwest, Pacific Coast, Rocky Mountain, Texas Regional and LA Gulf Coast, Sabine, and Texas City-Houston Subgroups.

Safety Program

A laboratory can be an extremely hazardous work environment, so safety must be integrated into all operations of a laboratory. The Occupational Safety and Health Administration (OSHA) established a requirement effective January 1, 1991, for laboratories to develop a Chemical Hygiene Plan (29 CRF 1910.1450). The guidelines for the Chemical Hygiene Plan were intentionally left general so that an organization's plan could be customized for unique situations in individual laboratories. The Chemical Hygiene Plan details an organization's responsibilities for safety training, supply and maintenance of safety equipment and personal protective equipment, monitoring employees' exposure level to hazardous chemicals, medical consultation and examination, and availability of documents addressing safety procedures and emergency response. The Chemical Hygiene Plan is required to be reviewed annually which provides a format to plan and track improvements.

Reference documents are an essential part of an effective safety program. Safety procedures should accompany and complement testing procedures to ensure an employee is performing functions in an acceptable manner. Emergency

response manuals address hazardous or potentially hazardous situations. Proper procedures for handling large spills, evacuation of work areas, and employees who have been overexposed to hazardous materials are typically found in the emergency response manual. Material Safety Data Sheets (MSDS) contain pertinent information regarding the hazards of chemicals and the necessary precautions. These documents should be distributed to employees or located in an easily accessible location.

Coordination with local fire and hazmat (hazardous material) departments is essential to ensure rapid emergency response. A chemical inventory and a diagram of the laboratory space are often requested by these departments to expedite their response. Periodic review of the chemical inventory will ensure unnecessary chemicals will be disposed of in a timely manner.

The most effective safety tool is thorough training of employees. Each new employee should be trained with the Chemical Hygiene Plan, safety procedures, emergency response manual, and MSDS's. Subsequent review sessions should be scheduled to ensure familiarity of individual responsibilities and actions. Educational videos are available specifically addressing laboratory safety which can assist in the training process. Hands-on training should be utilized to demonstrate the proper use of fire extinguishers, fire blankets, and other safety equipment in the laboratory. An effective safety program will produce aware employees who can suggest enhancements to the safety of the laboratory.

Personal safety equipment should be provided to all laboratory personnel. Eye protection, lab coats/aprons, and gloves will provide minimum protections. If the use of a fume hood is not practical and an employee is exposed to petroleum or chemical fumes, organic respirators should be provided to minimize exposure. Determination of which equipment is necessary for handling particular chemicals can be found in the MSDS accompanying the chemicals.

General laboratory safety equipment should be considered during the design or selection of a building. In addition to a good ventilation system, fume hoods should be provided where practical to isolate fumes from the laboratory. Due to the explosive nature of gasoline, even safety equipment needs to be evaluated for safety; for example, explosion-proof motors should be installed to evacuate fumes from a hood. Eyewash stations, fire extinguishers, emergency shower, and fire blankets should all be placed strategically for maximum protection.

In the event of a spill, several safety items will prove useful. Activated charcoal, sold under a variety of names, is effective for absorbing small petroleum spills with the added benefit of quickly reducing vaporization. Other companies offer pads to quickly absorb spills. Similar products are offered to neutralize and absorb acids and bases. Safety signs should be posted at the entrance of each laboratory room listing possible hazards and restricted activities (e.g., No Smoking, Flammables, Eye Protection Required, etc.). These signs assist visitors and emergency response personnel to identify hazards quickly.

Hazardous Waste

Testing laboratories generate quantities of hazardous waste. Waste chemicals from various analyses and residual samples must be stored and disposed in an appropriate manner. The majority of regulations for storage, disposal, and documentation of hazardous materials may be found in EPA's SARA Title III, 40 CFR 1500. Additional regulations and permits may be required by State, county or municipal agencies. Familiarity with the regulations will be advantageous when considering the design of the laboratory. Specific expenses related to hazardous waste disposal will often be determined by local regulations and the availability of hazardous waste handlers. Some companies provide disposal services which recycle products. This type of service is usually less expensive and provides protection from future "cradle to grave" liabilities. Therefore, waste materials should be segregated to take advantage of recycling services.

Personnel

The staffing requirements for a testing laboratory will be dependent on the number of samples, the number of tests performed on the samples, and the testing instruments chosen. The staff recommended here will be suitable for a fuels testing laboratory with moderate automation (auto-sampler for the gas chromatograph, automated RVP instrument, etc.) running approximately 6000 to 8000 samples per year.

1 Laboratory Administrator

2 Chemists

2 CFR Engine Operators

2 Laboratory Technicians

1 Clerk

The laboratory administrator should have strong management skills and familiarity with laboratory operations and chemical techniques. The administrator's responsibilities include the development and implementation of the quality assurance program, safety program, and hazardous waste program, as well as providing guidance for the daily operation of the laboratory.

The chemists should have a strong chemistry background and familiarity with instrumental techniques. In addition to normal analytical responsibilities, chemists should assist with the review of analytical results by technicians. Chemists also can assist in the development and implementation of the quality assurance, safety, and hazardous waste programs.

The engine operators are the most difficult positions to fill. The ideal operator will have petrochemical experience with a mechanic's background since the majority of the engine maintenance will be performed by the operators. The petroleum industry estimates approximately 5 years of engine operation is necessary to develop an expertise. To expedite this process, engine operators should periodically attend training workshops and regional exchange group meetings. Laboratory technicians should have laboratory experience and a familiarity with scientific methods. Cross training of these individuals is an effective means of maintaining an even workflow through the laboratory.

Concluding Note

There is no better way to understand the complexities of testing than to visit a state with an active program. Several States, such as Arkansas, California, Florida, Georgia, Maryland, North Carolina, Missouri, Michigan, Washington and Tennessee (a contractual laboratory) have active programs and are willing to host tours of their facilities. Interested parties are encouraged to make such a visit.

References:

John E. Nunemaker, "Planning Laboratories: A Step by Step Process" *American Laboratory* March 1987, 19 (4), 104-112.

Jerry Koenigsberg, "Building a Safe Laboratory Environment" *American Laboratory* June 1987, 19 (9), 96-106.

Appendix B

Current (2006) Handbook 130 Interpretation and Guidelines Section 2.3.2.

2.3.2. Fresh Fruits and Vegetables
(L&R, 1979, p. 176; 1980; 1982, p. 152)

Guideline

Recognizing the difficulty faced by consumers when more than one method of sale is employed in the same outlet for the same product, noncomparable methods of sale (e.g., weight and measure) for the same produce item in the same outlet should be minimized.

The methods of retail sale for fresh fruits and vegetables should be:

Commodity	Method of Sale	Commodity	Method of Sale
Apples	Weight or count, or by dry measure in units not less than 1 peck	Lettuce	Weight or count
Apricots	Weight	Limes	Weight or count
Artichokes	Weight or count	Mangoes	Weight or count
Asparagus	Weight or bunch	Melons (whole)	Weight or count
Avocados	Count	Melons (cut or pieces)	Weight
Bananas	Weight	Mushrooms	Weight or measure
Beans	Weight or dry measure, in units not less than 1 peck	Nectarines	Weight or count
Beets	Weight or bunch	Okra	Weight
Berries (all) [*NOTE 1*, see page 226]	Weight or measure	Onions (spring or green)	Weight or bunch
Broccoli	Weight or bunch	Onions (dry)	Weight
Brussels sprouts	Weight	Oranges	Weight or count
Cabbage	Weight	Papaya	Weight or count
Cantaloupes	Weight or count	Parsley	Weight or bunch
Carrots	Weight or bunch	Parsnips	Weight
Cauliflower	Weight or bunch	Peaches	Weight or count, or by dry measure in units not less than 1 peck
Celery	Weight or count	Pears	Weight or count, or by dry measure in units not less than 1 peck
Cherries [*NOTE 1*, see page 226]	Weight or measure	Peas	Weight
Coconuts	Weight or count	Peppers	Weight or count
Corn on cob	Count	Persimmons	Weight or count
Cranberries	Weight or measure	Plums	Weight or dry measure, in units not less than 1 peck
Cucumbers	Weight or count	Pineapples	Weight or count
Currants [*NOTE 1*, see page 226]	Weight or measure	Pomegranates	Weight or count

Commodity	Method of Sale	Commodity	Method of Sale
Dates	Weight	Potatoes (Irish or sweet)	Weight
Eggplant	Weight or count	Prunes	Weight
Escarole	Weight or bunch	Pumpkins	Weight or count
Figs	Weight	Radishes	Weight
Garlic	Weight or count	Rhubarb	Weight
Grapefruits	Weight or count	Rutabagas	Weight
Grapes	Weight	Spinach	Weight or bunch
Greens (all)	Weight	Tangerines	Weight or count
Kale	Weight	Tomatoes	Weight or dry measure, in units not less than 1 peck
Kohlrabi	Weight	Tomatoes (cherry) [*NOTE 1*, see page 226]	Weight or measure
Leeks	Weight	Turnips	Weight or bunch
Lemons	Weight or count		

NOTE 1: *Commodities sold by measure must be sold in containers standardized by the Berry Basket and Box Code in Handbook 44.*

Appendix C

Current (2005) Handbook 133 Section 2.3 on Moisture Allowances

Moisture Allowances

How is reasonable moisture loss allowed?

If the product tested is subject to moisture loss, provide for the moisture allowance by following the steps listed below.

Determine the value of the moisture allowance if the product is listed below.

What is the moisture allowance for flour and dry pet food?

The moisture allowance for flour and dry pet food is 3 % of the labeled net weight.

Note: Dry pet food means all extruded dog and cat foods and baked treat products packaged in Kraft paper bags and/or cardboard boxes with a moisture content of 13 % or less at the time of pack.

What moisture allowance is used with Used Dry Tare when testing packages that bear a USDA Seal of Inspection?

There is no moisture allowance when inspecting meat and poultry from a USDA inspected plant when Used Dry Tare and a Category A sampling plan are used.

What moisture allowance is used with wet tare when testing packages bearing a USDA seal of inspection?

- Use the following guideline when testing meat and poultry from any USDA inspected plant using Wet Tare and a Category A sampling plan.

- For packages of fresh poultry that bear a USDA seal of inspection, the moisture allowance is 3 % of the labeled net weight. For net weight determinations only, fresh poultry is defined as poultry above -3 ºC (26 ºF). This is a product that yields or gives when pushed with the thumb.

- For packages of franks or hotdogs that bear an USDA seal of inspection, the moisture allowance is 2.5 % of the labeled net weight.

- For packages of bacon, fresh sausage, and luncheon meats that bear a USDA seal of inspection, there is no moisture allowance if there is no free-flowing liquid or absorbent materials in contact with the product and the package is cleaned of clinging material. Luncheon meats are any cooked sausage product, loaves, jellied products, cured products, and any sliced sandwich style meat. This does not include whole hams, briskets, roasts, turkeys, or chickens requiring further preparation to be made into ready-to-eat sliced product. When there is no free-flowing liquid inside the package and there are no absorbent materials in contact with the product, Wet Tare and Dried Used Tare are equivalent.

When there is free flowing liquid or absorbent packaging materials in contact with the product, all free liquid is part of the wet tare.

Calculations

How is moisture allowance computed and applied to the average error?

To compute moisture allowance, multiply the labeled quantity by the decimal percent value of the allowance.

Example: Labeled net quantity of flour is 907 g (2 lb)

Moisture Allowance is 3 % (0.03)

Moisture Allowance = 907 g (2 lb) x 0.03 = 27 g (0.06 lb). Record this value in Box 13a. (Handbook 133, Appendix E)

How is the Maximum Allowable Variation corrected for the moisture allowance?

- Adjust the MAV by adding the moisture allowance to the MAV.

  Example: 907 g (2 lb) package of flour: moisture allowance added to the MAV = 31.7 g (0.07 lb) (MAV for 907 g [2 lb] package) + 27 g (0.06 lb) moisture allowance = a corrected MAV of 58.7 g (0.13 lb)

- Correct MAV in dimensionless units by converting the moisture allowance to dimensionless units = 0.06 lb ÷ 0.001 lb = 60. Go to Box 4 and add the moisture allowance in dimensionless units to the MAV in dimensionless units.

  Example: MAV = 70 (MAV for 2 lb where the unit of measure = 0.001 lb) + 60 (moisture allowance in dimensionless units) = 130. Minus package errors must exceed the MAV + gray area before they are declared "unreasonable errors."

- If the number of unreasonable errors exceeds the allowed number (recorded in Box 8) the inspection lot fails.

How is the average error for the moisture allowance corrected?

If the minus average error (Box 18) is larger (disregarding the sign) than the SEL (Box 23) and moisture loss applies, compare the difference between Box 18 and Box 23 with the moisture allowance recorded in Box 13a. (Make sure that all the values are in units of weight or in dimensionless units before making this comparison.) If Box 13a is larger than the difference between Box 18 and 23, then the lot is considered to be in the gray area.

Example: Box 13a for 2 lb flour is 60 (dimensionless units); Box 18 is 2 (dimensionless units); Box 23 is 0.550 (dimensionless units). The difference between Box 18 and Box 23 is 1.450 (dimensionless units). Since Box 13a is 60 (dimensionless units), 13a is larger than the difference between Box 18 and Box 23, the lot is considered to be in the gray area and further investigation is necessary before ruling out moisture loss as the reason for shortweight.

When the average error of a lot of fresh poultry, franks, or hot dogs from a USDA-inspected plant is minus, but does not exceed the established "moisture allowance" or "gray area," contact the appropriate USDA official and/or plant management personnel to determine what information is available on the lot in question. Questions to the USDA official and/or plant management representative may include:

(a) Is a quality control program in place?
(b) What information is available concerning the lot in question?
(c) If net weight checks were completed, what were the results of those checks?
(d) What adjustments, if any, were made to the target weight?

Note: If USDA or plant management has data on the lot, such data may help to substantiate that the "lot" met net content requirements at the point of manufacture.

This handbook provides "moisture allowances" for some meat and poultry products, flour, and dry pet food. These allowances are based on the premise that when the average net weight of a sample is

found to be less than the labeled weight, but not by an amount that exceeds the allowable limit, either the lot is declared to be within the moisture allowance or further investigation can be conducted.

Deviations from net quantity of contents caused by the loss or gain of moisture from the package are permitted when caused by ordinary and customary exposure to conditions that occur under good distribution practices. If evidence is obtained and documented to prove that the lot was shipped from the packaging plant in a shortweight condition or was distributed under inappropriate or damaging distribution practices, appropriate enforcement action should be taken.
(Amended 2002)